Space Weather Forecast

Issued on Tuesday, 03 September 2024 at 12:18 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate flares expected, slight chance of Strong flares. Chance of G1-G2 Geomagnetic storms, mainly Day 2 (04 Sep). Increasing chance of reaching S1/Minor Radiation Storm level.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity is Moderate with five Moderate flares observed over the past 24hrs, the peak of which occurred at 02/1343 UTC from a large region in the southeast. There are nine sunspot regions on the visible disc, three of which are sufficiently large and complex enough to be of interest for the forecast period. The largest region on the southwest of the disc continues to show consolidation of the intermediate region with penumbra here starting to mature, and magnetic complexity developing. A region near south-centre disc has numerous spots, and has also developed magnetic complexity. Finally, the newly arrived region in the far southeast appears to be a large and complex region, but due to foreshortening it is hard to distinguish the exact magnetic configuration at present. This region is showing significant looping in imagery, however. It is also being shortly followed by a further new region close to the limb, which may be magnetically connected and contributing to the looping. All other regions are relatively simple and stable at present.

A far-sided Coronal Mass Ejection (CME) was observed on coronagraph imagery around 03/0810UTC, analysis of this is currently underway. No other Earth directed CMEs have been observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: Solar wind parameters are currently close to background levels around 400 km/s, but have shown some slight enhancement fluctuating between 370-470km/s. This is perhaps due to the onset of a weak coronal hole fast wind. The Interplanetary Magnetic Field was weak, increasing to moderate after 02/1730 UTC. The north-south component, Bz, varied weakly before becoming mostly moderately northward directed between 02/1945 UTC and 03/0017 UTC. Geomagnetic activity was Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) has been rising in response to the larger flare on 01 Sep, but remains below the S1/Minor Radiation Storm level.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is expected with a slight chance of isolated Strong flares. The main flare risk is currently from any of the three larger sunspot regions in the southern hemisphere.

Solar Wind / Geomagnetic Activity: An eruption from 30/2330UTC may give a glancing blow on Day 1 (03 Sep). A large CME off the southeast limb on 01 Sep is expected to mostly pass well behind Earth's orbit, but some faint shock was evident in imagery, which means glancing impacts at Earth cannot be ruled out for this CME. The timing is low confidence, but perhaps later Day 1 or more likely Day 2 (04 Sep). Solar winds are at slightly elevated levels, likely due to

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a weak coronal hole fast wind. Slight enhancement to the solar winds is possible towards the end of Day 4 (06 Sep) should Earth connect to a further stream of solar winds from a coronal hole in the north of the disc.

Mostly Quiet to Unsettled (Kp 1-3) activity is expected. There is a chance of G1-G2/Minor-Moderate Storm intervals (Kp 5-6), later Day 1 or on Day 2, should there be any peripheral impacts due to the CME from 01 Sep.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is currently above background levels, but below the S1/Minor Radiation Storm threshold. There is a slightly increasing chance of exceeding S1 in the coming days.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	30	5	5
Strong	G3	No	2	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	80	80	80
Very Active	R3 to R5 X	No	25	25	25	25

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	20	25	25
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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